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Case report

Scapular bone destruction: A case report of skeletal tuberculosis with a series of dynamic radiologic features

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Abstract

Tuberculosis (TB) is an extremely common opportunistic infection in human immunodeficiency virus (HIV)-positive patients. Pulmonary TB is the most common manifestation while skeletal TB, especially with an involvement of flat bone like scapula, is quite rare. We report the first case scapular TB in an advanced AIDS individual who was initially considered as lymphoma because of the faulty interpretation of the positivity of PET/CT scan. In this article, we present a series of dynamic radiologic data and emphasize the differential diagnostic of skeletal TB.

Keywords: Scapular tuberculosis; Lymphoma; PET/CT; HIV/AIDS

1. Introduction

Tuberculosis (TB) remains a major global health problem, as the second leading cause of death from an infectious disease worldwide [1]. It typically affects the lungs. Osteoarticular TB is far less frequent and constitutes around 1–3% of all tuberculous cases with a predominant involvement of spine followed by joint and long bone [2–4]. TB involving flat bones, like scapula, is rarely encountered. To the best of our knowledge, there are only 24 cases have been reported in literature and this is the first case of scapular tuberculosis in HIV-positive patient [2,3,5–20]. In this article, we present a series of dynamic radiologic data and emphasize the differential diagnostic of skeletal TB.

2. Presentation of case

A 38-year-old male patient had been well until approximately 2 months earlier, when fever and pain in the left shoulder developed. He also mentioned weight loss, fatigue and cough. There was a history of AIDS for several months and he was out of regular treatment. On examination, multiple discrete cervical lymph nodes were palpable at the right side with the largest being 2.5*2.5 cm, non-tender and bilateral inguinal lymph nodes were also noticed. Laboratory studies showed a mild decrease in serum level of Ca^{2+} and marked an elevation in serum level of CA125 and β_2-microglobulin (β_2-MG), erythrocyte sedimentation rate (ESR), and white blood cells (WBC), being $14.2*10^9$/L, in which neutrophils counted 97.7% while lymphocytes 1.8%. $CD4^+$ T lymphocytes counted 39 cells/μl. Mycobacterial lipoarabinomanan (LAM) detection test was positive. ^{18}F-FDG PET/CT revealed not only focal FDG uptake in the regions of bilateral supraclavicular, axillary, hilar, mediastinal and retroperitoneal lymph nodes but bony erosion and intense FDG activity in the left scapula with abnormally increased metabolism of adjacent soft tissue (Fig. 1A). Malignant lymphoma was raised to suspicion. The bone marrow biopsy specimen and lymph node biopsy which were recommended for further evaluation, indicated anemia and AIDS-related lymphadenopathy respectfully and excluded the diagnosis of lymphoma

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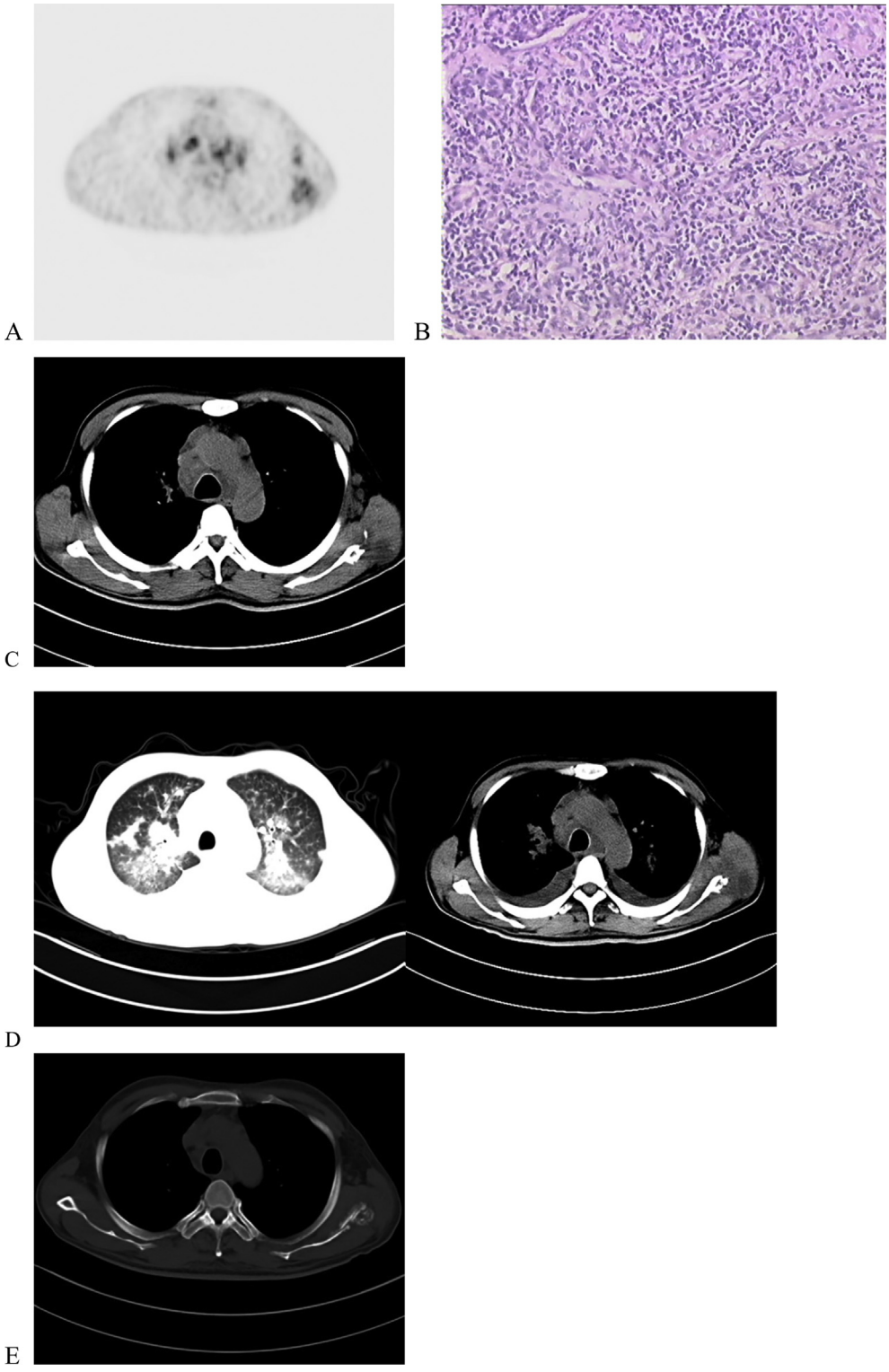

Fig. 1. A. PET/CT showed an FDG-avid in the regions of mediastinal lymph nodes and left scapular bony erosion as well as the adjacent soft tissue. B. Lymph node biopsy indicated AIDS-related lymphadenopathy (H&E, ×200). C. Bone window of chest CT scan revealed lytic destruction of the left scapula with discontinuous cortex and bony fragment. An adjacent soft-tissue swelling was noted as well. D. A follow-up CT scan of the 40th day demonstrated an exacerbation of the foci: bone window showed bone destruction aggravated and sequestra formed, ground glass opacities augmented and integrated and bilateral pleural effusion was observed. E. A follow-up CT scan of the 72nd day revealed that the absorption of scapular adjacent abscess and bilateral pleural effusion was noticed. Bone window showed periosteal reaction along the scapular cortex.

(Fig. 1B). A thoracic CT scan showed: 1) a mixture of well and poorly defined nodules and ground glass opacities widely disseminated throughout the lungs with mediastinal and bilateral axillary lymphadenopathy; 2) bone window showed lytic destruction of the left scapula with discontinuous cortex and bony fragment; 3) an adjacent soft-tissue swelling around the destroyed bone was also noted and no communication was remarked between the scapular lesion and lung parenchyma or pleural cavity (Fig. 1C). It suggests pulmonary infection and scapular osteomyelitis with sequestra and adjacent abscess formation.

After a retrospective analysis of the radiologic studies and library tests, a presumptive diagnosis of pulmonary tuberculosis with concomitant scapular infection was considered. Since the patient refused other biopsy, an empiric anti-tuberculous treatment underwent. The patient was at advanced stage of AIDS and considering his basic condition, the use of ART was set aside temporarily. At the follow-up after almost three months, the superficial lymph nodes were impalpable and a symptomatic improvement was achieved. The follow-up CT scan of chest demonstrated: 1) the pulmonary miliary foci of the initial CT scan decreased in number and size; 2) the absorption of scapular adjacent abscess was noticed; 3) bone window showed periosteal reaction along the scapular cortex, which confirmed the diagnosis of tuberculosis (Fig. 1E).

3. Discussion

TB of skeletal system mainly results from hematogenous dissemination and induces non-specific clinical presentations, being local pain, swelling and functional limitation of joint movements. ESR elevates without specificity. In recent studies, LAM test, which holds a great diagnostic value in HIV-positive individuals, could be positive [21]. Radiological images frequently show osteopenia, worm bitten liked foci with localized cortical bone erosion and surrounding soft tissue mass. Varying sclerosis may also be present [15,19,22]. In our case, 1) lytic lesion and sequestra formation appeared at the early stage while cold abscesses developed later. Periosteal reaction was present only when anti-tuberculous therapy worked; 2) during the period of treatment, an exacerbation was noted not only in the symptomatic aspect, but also in the radiologic aspect, which may result from paradoxical response of anti-TB treatment (Fig. 1D); 3) multiple lymphadenopathy with increased metabolism and focal FDG uptake of bony destruction and in the surrounding soft tissue indicated malignant disease with high possibility. However, the inflammatory tissue has an increased glucose turnover just as the malignant cells and positive findings of PET/CT are commonly seen in inflammatory lesions such as tuberculosis or pyogenic abscess [23]. Positivity of PET/CT can't be a conclusive evidence for differential diagnosis and infection, both acute and/or chronic including mycobacterial or fungal, should be considered, especially in HIV-positive patients just like in this case; 4) miliary nodules in bilateral lungs formed tree-in-bud appearance, suggesting disseminated pulmonary TB which occurs more often in advanced stage of HIV infection ($CD4^+$ T cells count <200 cells/μl) [24]. The co-existence of pulmonary TB and scapular TB was reported in one-third of osteoarticular TB patients [19].

Malignant lymphoma is a defining lesion of AIDS. Osseous lymphoma, usually due to non-Hodgkin lymphoma, preferentially affects appendicular skeletons with the most common radiological feature being lytic lesion with moth-eaten zone, cortical breach and extra-osseous soft tissue mass. Besides, tumor may invade joint or vertebral and cross to adjacent bone, narrowing the differential diagnosis [25]. PET/CT shows an FDG-avid in the tumor mass. Although PET/CT is more accurate in early detection of lymphoma, lack of pathognomonic features, it may be falsely interpreted in patients (especially HIV infected patients) suspected with infections. An increase of ESR and serum level of LDH and Ca^{2+} may also be present when bony invasion appears. A very few articles have reported pulmonary involvement of lymphoma with an appearance of isolated or multiple nodular or mass like density and lymphadenopathy on CT scan [26,27].

Besides lymphoma, the differential diagnosis of skeletal TB, especially in HIV-positive patients, should also consider pyogenic or fungal osteomyelitis, eosinophilic granuloma and multiple myeloma. Eosinophilic granuloma is benign bony disease that preferentially occurs in children. It characteristically presented one or several punched-out or expansile lesion(s) with sharply marginated by normal-appearing bone, which differentiates it from skeletal TB [28]. The early appearance of periosteal reaction and more pronounced reactive new bone formation also help well to distinguish pyogenic from tuberculous osteomyelitis [18].

Kaposi sarcoma (KS) rarely invades the musculoskeletal system. Most osseous KS manifestations are osteolytic foci with cortical or complete bone destruction, leading to a bubbly appearance. Periosteal reaction is infrequent and adjacent skin lesion could be noted [29,30].

The extrapulmonary tuberculosis diagnosis is still a great challenge and often made with a significant delay because of non-specific clinical findings and poor performance of diagnostic tests. Although the microbiological tests still play a conclusive in the TB diagnosis, a wise integration of clinical findings, histology, microbiology, radiology and response to treatment is recommended as a better ‘gold standard’ of TB diagnosis [4]. In our patient, the positivity of LAM, and the radiological changes before and after anti-TB treatment confirmed the TB diagnosis.

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